Mathematics K-6 GLE Glossary DRAFT

The Mathematics K-6 Glossary provides definitions and descriptions for words found in the Mathematics Grade-Level Expectations. The same word may appear in more than one grade level but have a slightly different definition because of context. The words in the glossary have been written to best match the focus and terminology for a particular grade level. This document is still in a draft format, with possible word changes and the addition of new terms to occur at a future date.

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Kindergarten	
attributes: a characteristic or distinctive feature—such as shapes, size, color—of an object or given set of objects.	Eather, J. *A math dictionary for kids*. Retrieved June 5, 2004, from http://www.amathsdictionaryforkids.com
model: to represent a mathematical situation with manipulatives (objects), pictures, numbers or symbols.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 95). Reston, VA: Author
1st Grade	
attributes: a characteristic or distinctive feature—such as shapes, size, color—of an object or given set of objects.	Eather, J. *A math dictionary for kids*. Retrieved June 5, 2004, from http://www.amathsdictionaryforkids.com
expression: a mathematical phrase that represents a number through the combination of operation symbols, numbers and/or symbols. Examples: 2 + 3 ; 5 - 4	*Math at hand: A mathematics handbook* (p. 523). (1999). Wilmington, MA: Great Source Education Group, Inc
close to doubles: number combinations such as 3 + 4, 6 + 7, etc. that are 1 apart.	
compose or decompose numbers: flexibly using or knowing numbers through creating and breaking numbers apart to form equivalent representations. For example knowing that in 4 there is a "3" and a "1" allows a student to think about 7 + 4 as being 7 + 3 + 1.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 82). Reston, VA: Author
develop fluency: developing fluency means the process of memorizing some combinations or - having command of some combinations - not having to count, use manipulatives or draw pictures to find the sum or difference; fluency means that students are able to compute efficiently and accurately with single digit numbers.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 84). Reston, VA: Author.
model: to represent a mathematical situation with manipulatives (objects), pictures, numbers or symbols.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 95). Reston, VA: Author
repeating patterns: patterns that are cyclical in nature, with each cycle repeating elements in the same order. Example: ABCABCABC.	*Navigating through algebra in grades pre-k–2* (p. 7.) (2001). Reston, VA: National Council of Teachers of Mathematics.
2nd Grade	
attributes: a characteristic or distinctive feature—such as shapes, size, color—of an object or given set of objects	Eather, J. *A math dictionary for kids*. Retrieved June 5, 2004, from http://www.amathsdictionaryforkids.com
commutative principle (law, rule or property): in addition and multiplication, numbers may be added or multiplied in any order.	Eather, J. *A math dictionary for kids*. Retrieved August 6, 2004, from http://www.amathsdictionaryforkids.com

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commutative property of addition: the sum stays the same when the order of the addends is changed. Example: 6 + 4 = 4 + 6.	*Math at hand: A mathematics handbook* (p. 519). (1999). Wilmington, MA: Great Source Education Group
Compose or decompose numbers: flexibly using or knowing numbers through creating and breaking numbers apart to form equivalent representations. For example knowing that in 4 there is a "3" and a "1" or a allows a student to think about 27 +14 as being 20 + 10 + 7 + 3 + 1 or 30 + 10 + 1 = 41.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 82). Reston, VA: Author
demonstrate fluency: demonstrate fluency means that students are able to compute efficiently and accurately with single digit numbers	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 84). Reston, VA: Author.
expression: a mathematical phrase that represents a number through the combination of operation symbols, numbers and/or symbols. Examples: 2 + 5 ; 4 - 2	*Math at hand: A mathematics handbook* (p. 523). (1999). Wilmington, MA: Great Source Education Group, Inc.
growing patterns: patterns that show an arithmetic change between pairs of elements in the pattern. For example, growing patterns may show numbers in decreasing order or buildings in decreasing size. Example: 3,5,8,12, ……	*Navigating through algebra in grades pre-k–2* (p. 8.) (2001). Reston, VA: National Council of Teachers of Mathematics.
landmark numbers: numbers that provide a foundation for extending number sense concepts. For example, at the second grade level generally include sums of tens and getting to the next ten or counting by fives.	*NCTM (2000) Principles and standards for school mathematics. Reston, VA. NCTM. pp. 83-84. NCTM*
model: to represent a mathematical situation with manipulatives (objects), pictures, numbers or symbols.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 95). Reston, VA: Author
number sentence: equations or comparisons. Examples: 3 + 4 = 7; 8 – 2 = 6; 7 > 6.	Cavanagh, M. (2002). *Math to learn* (p. 457). Wilmington, MA: Great Source Education Group, Inc.
Parts of geometric figures: faces, vertices, sides, edges, lines, etc.	National Council of Teachers of Mathematics. (2001). *Navigating through geometry in prekindergarten–grade 2* (p. 2). Reston, VA: Author
qualitative change: a change (in the quality of something) that can be described by words such as taller, shorter, darker, lighter, warmer, etc.	Greenes, C., Cavanagh, M., Dacey, L., Findell, C., Small, M. (2001). *Navigating through algebra in prekindergarten–grade 2* (p. 4). Reston, VA: National Council of Teachers of Mathematics

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3rd Grade	
attributes: a characteristic or distinctive feature—such as shapes, size, color—of an object or given set of objects.	Eather, J. *A math dictionary for kids*. Retrieved June 5, 2004, from http://www.amathsdictionaryforkids.com
bar graph: a graph that uses the height or length of rectangles to compare data.	Cavanagh, M. (2000). *Math to know* (p. 443). Wilmington, MA: Great Source Education Group, Inc.
classify numbers: to group a set of numbers together by an attribute, such as even or odd, less than 20, more than 20, etc. recognizing that different types of numbers have particular characteristics.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 151).
commonly used fractions: halves, thirds, fourths, fifths, sixths, eighths, and tenths.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 150).
commutative property of addition: the sum stays the same when the order of the addends is changed. Example: 6 + 4 = 4 + 6.	*Math at hand: A mathematics handbook* (p. 519). (1999). Wilmington, MA: Great Source Education Group
composing or decomposing numbers: flexibly using or knowing numbers through creating and breaking numbers apart to form equivalent representations. For example, 36 can be thought of as 32 + 4, 20 + 16, 40 – 4, 12 X 3, etc.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 149).
congruent: objects that have the same shape and size are congruent.	Abdelnoor, J. R. E. (1979). The silver Burdett mathematical dictionary (Rev. Ed.) (p. 21). Silver Burdett Press: Morristown, New Jersey.
develop fluency: developing the ability for efficient and accurate methods of computing and being able to demonstrate flexibility in computational methods chosen which result in students being able to explain their methods and produce accurate answers.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 152).
expression: a mathematical phrase that represents a number through the combination of operation symbols, numbers and/or symbols. Examples: 2 x 60; 3 + Δ	*Math at hand: A mathematics handbook* (p. 523). (1999). Wilmington, MA: Great Source Education Group, Inc.
identity property of addition: if you add a zero to a number, the sum is the same as that given number. Example: 7 + 0 = 7	*Math at hand: A mathematics handbook* (p. 525). (1999). Wilmington, MA: Great Source Education Group, Inc.
line graph: a graph used to show change over time with points connected by line segments.	Cavanagh, M. (2000). *Math to know* (p. 454). Wilmington, MA: Great Source Education Group, Inc.
line plot: a diagram showing frequency of data on a number line.	Cavanagh, M. (2000). *Math to know* (p. 455). Wilmington, MA: Great Source Education Group, Inc.

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model: to represent a mathematical situation with manipulatives (objects), pictures, numbers or symbols.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 95). Reston, VA: Author
number sentences: equations or comparisons. Examples: 3 + 4 = 7, 8 – 2 = 6, 7 > 6	Cavanagh, M. (2002). *Math to learn* (p. 457). Wilmington, MA: Great Source Education Group, Inc.
pictorial (picture) graph: a graph that uses pictures or symbols to show data.	Cavanagh, M. (2000). *Math to know* (p. 460). Wilmington, MA: Great Source Education Group, Inc.
quantitative: relating to number or quantity; elements can be counted or measured.	Eather, J. *A math dictionary for kids*. Retrieved June 5, 2004, from http://www.amathsdictionaryforkids.com.
referent: a familiar object or place that a student can use as a basis for estimating the measurement of something; students might think of the length of their desks, the size of an orange, etc.	*Joram, E. (2003). Benchmarks as tools for developing measurement sense.* Clements, D. H. & Bright, G. (Eds.) *Learning and teaching measurement.* Reston, VA: National Council of Teachers of Mathematics, 2003. (p. 57-67).
shape of data: An overview of numerical data—the highest and lowest points (range) of the data, where most of the data are clumped together, where there are no data, where there are be data located far from the rest of the data (outliers), as well as what the mode and median are.	Russell, S. J., Schifter, D., and Bastable, V. (2002). *Developing mathematical ideas: working with data casebook* (p. 65-8). Parsippany, NJ: Dale Seymour Publications.
4th Grade	
array: a set of objects in equal rows and equal columns.	Cavanagh, M. (2002). *Math to learn* (p. 98). Wilmington, MA: Great Source Education Group, Inc.
attributes: a characteristic or distinctive feature—such as shapes, size, color—of an object or given set of objects.	Eather, J. *A math dictionary for kids*. Retrieved June 5, 2004, from http://www.amathsdictionaryforkids.com
benchmark: a reference that is based on situations that are commonly known such as a dollar bill (six inches), the distance of a doorknob from the floor (about a meter or yard), a half-gallon of milk, a two-liter soda, and five pounds of sugar.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 174). Reston, VA: Author
categorical data: data that represents individuals or objects by one or more characteristics or traits they share, such as maleness or femaleness or blue eyes for green eyes." Categorical data is often treated as counts, proportions, or percentages of people or things in them.	*Navigating though data analysis and probability in grades 3 -5* (p. 19.) (2002). Reston, VA: National Council of Teachers of Mathematics
commutative property of multiplication: the product stays the same when the order of the factors is changed. Example: 8 x 5 = 5 x 8.	*Math at hand: A mathematics handbook* (p. 519). (1999). Wilmington, MA: Great Source Education Group, Inc.

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composing or decomposing numbers: flexibly using or knowing numbers through creating and breaking numbers apart to form equivalent representations. For example, 36 can be thought of as 32 + 4, 20 + 16, 40 – 4, 12 X 3, 72/2 etc.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 149).
demonstrate fluency: demonstrating the ability for efficient and accurate methods of computing and being able to demonstrate flexibility in computational methods chosen which result in students being able to explain their methods and produce accurate answers.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 152).
expression: a mathematical phrase that represents a number through the combination of operation symbols, numbers and/or symbols. Examples: 23 x 67; 33-**Δ**	Cavanagh, M. (2000). *Math to know* (p. 450). Wilmington, MA: Great Source Education Group, Inc.
even : a whole number that is divisible by 2.	*Math at hand* : *A mathematics handbook.* (p. 523). (1999). Wilmington, MA: Great Source Education Group, Inc.
features (of the data set): features include the range, the outliers, the median, mean and mode. It is important that students not only identify these features, but also know at they indicate about the data.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 179).
flipping/reflecting: a transformation creating a mirror image of a figure on the opposite side of a line.	*Math at hand: A mathematics handbook* (p. 533). (1999). Wilmington, MA: Great Source Education Group, Inc.
fluency: refers to having efficient and accurate methods for computing.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 152).
identity property of multiplication: if you multiply a number by one, the product is the same as the number.	Cavanagh, M. (2000). *Math to know* (p. 526). Wilmington, MA: Great Source Education Group, Inc.
line plot: a diagram showing frequency of data on a number line.	Cavanagh, M. (2000). *Math to know* (p. 455). Wilmington, MA: Great Source Education Group, Inc.
median (feature of data): when the numbers are arranged from least to greatest, the middle number of a set of numbers, or the mean of two middle numbers when the set has two middle numbers.	*Math at hand: A mathematics handbook* (p. 527). (1999). Wilmington, MA: Great Source Education Group, Inc.
mode (feature of data): the number that appears most frequently in a set of numbers. There may be one, more than one, or no mode.	*Math at hand: A mathematics handbook* (p. 528). (1999). Wilmington, MA: Great Source Education Group, Inc.
model: to represent a mathematical situation with manipulatives (objects), pictures, numbers or symbols.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 95). Reston, VA: Author

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multiple: the product of a whole number and any other whole number.	*Math at hand: A mathematics handbook* (p. 528). (1999). Wilmington, MA: Great Source Education Group, Inc.
number sentence: an equation or comparison. Examples: 3 + 4 = 7, 8 – 2 = 6, 7 > 6.	Cavanagh, M. (2002). *Math to learn* (p. 457). Wilmington, MA: Great Source Education Group, Inc.
numerical data: represent objects or individuals by numbers assigned to certain measurable properties, such as their length or their age.	*Navigating though daa analysis and probability in grades 3 -5* (p. 19.) (2002). Reston, VA: National Council of Teachers of Mathematics.
odd: a whole number that is not divisible by 2.	*Math at hand: A mathematics handbook* (p. 529). (1999). Wilmington, MA: Great Source Education Group, Inc.
outlier: a number in a set of data that is much larger or smaller than most of the other numbers in the set.	*Math at hand: A mathematics handbook* (p. 529). (1999). Wilmington, MA: Great Source Education Group, Inc.
prism: a 3-dimensional figure in which all of the surfaces are polygons.	*Math on call: A mathematics handbook* (p. 588). (1998). Wilmington, MA: Great Source Education Group, Inc.
range (feature of data): the difference between the greatest and the least value in a set of data.	*Math at hand: A mathematics handbook* (p. 532). (1999). Wilmington, MA: Great Source Education Group, Inc.
set: a collection of distinct elements or items.	*Math at hand: A mathematics handbook* (p. 534). (1999). Wilmington, MA: Great Source Education Group, Inc.
sliding/translating: a transformation that involves sliding a figure a given distance in a given direction.	*Math at hand: A mathematics handbook* (p. 536). (1999). Wilmington, MA: Great Source Education Group, Inc.
transformations: the mapping, or movement of all points of a figure in a plane according to a common operation . Examples of the operation include rotations, dilations, reflections, and translations.	*Intermath* *www.intermath-uga-gatech/dictionary/*
transforming shapes: changing plane figures by mapping or moving every point to a new location.	*Math at hand: A mathematics handbook* (p. 536). (1999). Wilmington, MA: Great Source Education Group, Inc.
turning/rotating: a transformation that involves turning a figure at a given angle and in a given direction around a point	*Math at hand: A mathematics handbook* (p. 534). (1999). Wilmington, MA: Great Source Education Group, Inc.
5th Grade	
associative property of addition: the sum stays the same when the grouping of the addends is changed. Example: (5+4) +6 = 5 + (4+6)	*Math at hand: A mathematics handbook* (p. 517). (1999). Wilmington, MA: Great Source Education Group, Inc.

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associative property of multiplication: the product stays the same when the grouping of the factors is changed. Example: (3 x 4) X 7 = 3 x (4 x 7)	*Math at hand: A mathematics handbook* (p. 517). (1999). Wilmington, MA: Great Source Education Group, Inc.
attributes: a characteristic or distinctive feature—such as shapes, size, color—of an object or given set of objects.	Eather, J. *A math dictionary for kids*. Retrieved June 5, 2004, from http://www.amathdictionaryforkids.com
categorical data: data that represents individuals or objects by one or more characteristics or traits they share, such as maleness or femaleness or blue eyes for green eyes." Categorical data is often treated as counts, proportions, or percentages of people or things in them.	*Navigating though data analysis and probability in grades 3 -5* (p. 19.) (2002). Reston, VA: National Council of Teachers of Mathematics
center point (of rotation): the point that a geometric figure is rotated or turned around. The point can be on the figure, but does not have to be.	*Algebra to go: A mathematics handbook.* (p 481). (2000). Wilmington, MA. Great Source Education Group, Inc.
commonly used fractions: halves, thirds, fourths, fifths, sixths, eighths, and tenths.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 150).
composing or decomposing numbers: flexibly using or knowing numbers through creating and breaking numbers apart to form equivalent representations. For example, 36 can be thought of as 32 + 4, 20 + 16, 40 – 4, 12 X 3, 72/2 etc.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 149).
composite number: a number that has more than two factors.	*Math at hand: A mathematics handbook* (p. 520). (1999). Wilmington, MA: Great Source Education Group, Inc.
coordinate systems: two-dimensional systems in which the coordinates of a point are its distances from two intersecting, usually perpendicular straight lines called axes	Cavanagh, M. (2000). *Math to know* (p. 446). Wilmington, MA: Great Source Education Group, Inc.
distributive property: when one of the factors of a product is written as a sum, multiplying each addend before adding does not change the product. Example: 3 x (5 + 4) = (3 x 5) + (3 x 4)	*Math at hand: A mathematics handbook* (p. 522). (1999). Wilmington, MA: Great Source Education Group, Inc.
even: a whole number that is divisible by 2.	*Math at hand: A mathematics handbook* (p. 523). (1999). Wilmington, MA: Great Source Education Group, Inc.
expression: a mathematical phrase that represents a number through the combination of operation symbols, numbers and/or symbols. Examples: 23 x 67; 3a; x+y	Cavanagh, M. (2000). *Math to know* (p. 450). Wilmington, MA: Great Source Education Group, Inc.

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factor: an integer that will divide evenly into another number.	*Math at hand: A mathematics handbook* (p. 524). (1999). Wilmington, MA: Great Source Education Group, Inc.
flipping/reflecting: a transformation creating a mirror image of a figure on the opposite side of a line	*Math at hand: A mathematics handbook*. (p. 533). (1999). Wilmington, MA: Great Source Education Group, Inc
fractions: a way of representing part of a whole (or a group) by telling the number of equal parts in the whole and the number of those parts you are describing.	*Algebra to go: A mathematics handbook.* (p 489). (2000). Wilmington, MA. Great Source Education Group, Inc.
generalizations: reasoning about the structure of a pattern or rule.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 159). Reston, VA: Author.
model: to represent a mathematical situation with manipulatives (objects), pictures, numbers or symbols.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 95). Reston, VA: Author
net of a prism: a flat 2-dimensional shape that can be folded into a 3-dimensional solid.	Eather, J. *A math dictionary for kids*. Retrieved June 5, 2004, from http://www.amathsdictionaryforkids.com.
number sentence: an equation or comparison. Examples: 3 + 4 = 7, 8 – 2 = 6, 7 > 6.	Cavanagh, M. (2002). *Math to learn* (p. 457). Wilmington, MA: Great Source Education Group, Inc.
numerical data: data that represent objects or individuals by numbers assigned to certain measurable properties, such as their length or their age.	*Navigating though daa analysis and probability in grades 3 -5* (p. 19.) (2002). Reston, VA: National Council of Teachers of Mathematics.
odd: a whole number that is not divisible by 2.	*Math at hand: A mathematics handbook* (p. 529). (1999). Wilmington, MA: Great Source Education Group, Inc.
partitive: distribution division that involves figuring out how many are in the group when the number of groups is known. Example: How would you divide 24 cookies equally among 6 children? (Think of dividing or partitioning the cookies into 6 equivalent subsets.)	Fosnot, C and Dolk, M, (2001). Young mathematicians at Work: constructing multiplication and division, (p. 53 – 57). Heineman.
prime number: a number that has exactly two different positive factors, itself and 1.	*Math at hand: A mathematics handbook* (p. 531). (1999). Wilmington, MA: Great Source Education Group, Inc.
quotative: measurement division that involves seeing how many groups will fit into a number. Example: If a serving consists of 4 cookies and you have 24 cookies, to how many children can you give a serving of cookies? (Think of making one pile of 4 cookies, then a second pile of 4 cookies, etc.)	Fosnot, C and Dolk, M, (2001). Young mathematicians at Work: constructing multiplication and division, (p. 53 – 57). Heineman.
rotational symmetry: a property of a figure that is mapped onto itself by a rotation of 180^0 or less.	*Geometry to go* (p. 470). (2001). Wilmington, MA: Great Source Education Group, Inc.

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sliding/translating: a transformation that involves sliding a figure a given distance in a given direction.	*Math at hand: A mathematics handbook* (p. 536). (1999). Wilmington, MA: Great Source Education Group, Inc
square number: the number of dots in a square array; the product of an integer multiplied by itself.	*Math at hand: A mathematics handbook* (p. 531; 535). (1999). Wilmington, MA: Great Source Education Group, Inc
transformation: the mapping, or movement of all points of a figure in a plane according to a common operation. Examples of the operation include rotations, dilations, reflections, and translations.	*Math at hand: A mathematics handbook* (p. 536). (1999). Wilmington, MA: Great Source Education Group, Inc
transforming shapes: changing plane figures by moving or mapping every point in a plane figure to a new location.	*Math at hand: A mathematics handbook* (p. 536). (1999). Wilmington, MA: Great Source Education Group, Inc.
translation: a transformation in which a figure is slid a given distance in a given direction	*Math at hand: A mathematics handbook* (p. 536). (1999). Wilmington, MA: Great Source Education Group, Inc.
turning/rotating: a transformation that involves turning a figure at a given angle and in a given direction around a point.	*Math at hand: A mathematics handbook* (p. 534). (1999). Wilmington, MA: Great Source Education Group, Inc.
unit fraction: a fraction with a numerator of 1, for example, ½, 1/3, ¼, 1/10	*Math at hand: A mathematics handbook* (p. 537). (1999). Wilmington, MA: Great Source Education Group, Inc.
6th Grade	
associative property of addition: the sum stays the same when the grouping of the addends is changed. Example: (22 + 13) +12 = 22 + (13 + 2)	*Math at hand: A mathematics handbook* (p. 517). (1999). Wilmington, MA: Great Source Education Group, Inc.
associative property of multiplication: the product stays the same when the grouping of the factors is changed. Example: (8 x 7) x 13 = 8 x (7 x 13)	*Math at hand*: *A mathematics handbook* (p. 517). (1999). Wilmington, MA: Great Source Education Group, Inc.
benchmark: a reference that is based on situations that are commonly known such as a dollar bill (six inches), the distance of a doorknob from the floor (about a meter or yard), a half-gallon of milk, a two-liter soda, and five pounds of sugar.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 174). Reston, VA: Author
common factor: a number that is a factor of two or more numbers.	*Math on call: A mathematics handbook* (p. 576). (1998). Wilmington, MA: Great Education Source Group, Inc.

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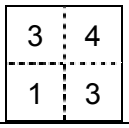
common multiple: a number that is a multiple of two or more numbers.	*Math on call: A mathematics handbook* (p. 576). (1998). Wilmington, MA: Great Education Source Group, Inc.
composing or decomposing numbers: flexibly using or knowing numbers through creating and breaking numbers apart to form equivalent representations. For example, 36 can be thought of as 32 + 4, 20 + 16, 40 – 4, 12 X 3, 72/2 etc.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 149).
conjecture: A proposition which is consistent with known data, but has neither been verified nor shown to be false. It is synonymous with hypothesis.	Retrieved February 15, 2005 from *http://mathworld.wolfram.com/Conjecture.html*
corresponding angles: angles that are in the same relative position in similar or congruent figures.	*Geometry to go: A mathematics handbook* (p. 452). (2001). Wilmington, MA: Great Source Education Group, Inc.
corresponding sides of similar triangles: Sides that are in the same relative position in similar or congruent figures. Similar triangles are triangles that have proportional corresponding sides and congruent corresponding angles	*Geometry to go: A mathematics handbook* (pp. 452, 472). (2001). Wilmington, MA: Great Source Education Group, Inc.
distributive property: when one of the factors of a product is written as a sum, multiplying each addend before adding does not change the product. Example: 7 x (11 + 13) = (7x11) + (7 x 13)	*Math at hand: A mathematics handbook* (p. 522). (1999). Wilmington, MA: Great Source Education Group, Inc.
factor: an integer that will divide evenly into another number.	*Math at hand: A mathematics handbook* (p. 524). (1999). Wilmington, MA: Great Source Education Group, Inc.
functions: relations in which every value of *x* has a unique value of *y*.	*Math on call: A mathematics handbook* (p. 583). (1998). Wilmington, MA: Great Education Source Group, Inc.
image: a figure that is created after a shape undergoes a transformation.	*Geometry to go: A mathematics handbook* (p. 467). (2001). Wilmington, MA: Great Source Education Group, Inc.
isometric representations: drawings that provide a corner view of an object, thus showing three dimensions	*Geometry to go: A mathematics handbook* (p. 459). (2001). Wilmington, MA: Great Source Education Group, Inc.
linear (function) equation: an equation whose graph in a coordinate grid is a straight line.	*Math on call: A mathematics handbook* (p. 583). (1998). Wilmington, MA: Great Education Source Group, Inc.
mat plans: drawings of the base of a cube on squares, with numbers on the squares to show how high each stack of cubes is. 	Lappan, G. Frey, J. T., Fitzgerald, W. M., Friel, S. N., & Phillips, E. D. (2002). Ruins of Montarek spatial visualization. *Connected mathematics* (p. 9). Glenview, IL: Prentice Hall.
mean: the measure of center found by dividing the sum of two or more numbers by the number of addends.	Cavanagh, M. (2000). *Math to Know.* Wilmington, MA*:* Great Source Education Group, Inc. p.455.

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measure of center: measures of center or central tendency describe where data are centered; measures of center include the mean, median, and mode.	Billstein, R., Libesking, S., & Lott, J.W. (1998). *A problem solving approach to mathematics for elementary teachers*. (p. 492). Reading, MA. Addision-Wesley.
median: when the numbers are arranged from least to greatest, the middle number of a set of numbers, or the mean of two middle numbers when the set has two middle numbers.	*Math at hand: A mathematics handbook* (p. 527). (1999). Wilmington, MA: Great Source Education Group, Inc.
mode: the number that appears most frequently in a set of numbers; there may be one, more than one, or no mode.	*Cavanagh, M.* (2000). *Math to Know.* Wilmington, MA: Great Source Education Group, Inc. p.*45.*
model: to represent a mathematical situation with manipulatives (objects), pictures, numbers or symbols.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 95). Reston, VA: Author
multiple: the product of a whole number and any other whole number.	*Math on call: A mathematics handbook* (p. 584). (1998). Wilmington, MA: Great Education Source Group, Inc.
nonlinear (function) equation: a function whose graph in a coordinate grid is not a straight line.	*Algebra to go: A mathematics handbook* (p. 459). (1998). Wilmington, MA: Great Source Education Group, Inc.
non-standard units**:** measuring units such as paper clips, pencils, etc. that can be used to help understand the nature of units; tiles and dominoes can be used as non-standard units for area measure.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 105). Reston, VA: Author
pre-image: the original figure in a transformation.	*Geometry to go: A mathematics handbook* (p. 458). (2001). Wilmington, MA: Great Source Education Group, Inc.
properties of 1-2- and 3- dimensional shapes: common features of 1-, 2-, and 3-dimensional shapes, such as number and length of sides, angle measures, etc.	Eather, J. *A math dictionary for kids*. Retrieved August 25, 2004, from http://www.amathsdictionaryforkids.com.
range: the difference between the greatest and the least value in a set of data.	*Math at hand: A mathematics handbook* (p. 532). (1999). Wilmington, MA: Great Source Education Group, Inc.
reflection/flips: a transformation in which a figure is flipped over a line called the line of reflection; corresponding points in the image and pre-image are equidistant from the line of reflection.	*Geometry to go: A mathematics handbook* (p. 469). (2001). Wilmington, MA: Great Source Education Group, Inc.
representations: physical objects, drawings, charts, graphs, and symbols that help students communicate their thinking.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 280). Reston, VA: Author.
rotation/turn: a transformation that forms an image by turning its pre-image about a point.	*Geometry to go: A mathematics handbook* (p. 470). (2001). Wilmington, MA: Great Source Education Group, Inc.
rotational symmetry: a property that allows a figure to be mapped onto itself as it is rotated 180 degrees or less.	*Geometry to go: A mathematics handbook* (p. 470). (2001). Wilmington, MA: Great Source Education Group, Inc.

Mathematics K-6 GLE Glossary DRAFT

standard units of measure: measurements that are used to communicate in the United States (customary) and around the world (metric system).	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 172). Reston, VA: Author.
stem- and- leaf plot: a method of organizing data from least to greatest using the digits of the greatest place value to group data. The data is separated in to stems (tens) and leaves (ones).	*Math on call: A mathematics handbook* (p. 593). (1998). Wilmington, MA: Great Education Source Group, Inc.
symbolic rules: rules that use variables and numbers to describe a pattern or express a relationship.	*Navigating through algebra in grades 6–8* (p. 3) (2001). Reston, VA: National Council of Teachers of Mathematics
translation/slide: a transformation in which an image is formed by moving or mapping every point on a figure the same distance in the same direction. Points in the original figure are equidistant from their image.	*Geometry to go: A mathematics handbook*(p. 475). (2001). Wilmington, MA: Great Source Education Group, Inc.
visual model: models such as networks that could be used to analyze and solve real problems as those concerned with efficiency. The models of 2- and 3-dimensional objects may also assist in the students' reasoning about spatial relationships.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 237). Reston, VA: Author

Mathematics 7-12 Glossary DRAFT

The Mathematics 7-12 Glossary provides definitions and descriptions for words found in the Mathematics Grade-Level Expectations. The same word may appear in more than one grade level but have a slightly different definition because of context. The words in the glossary have been written to best match the focus and terminology for a particular grade level. This document is still in a draft format, with possible word changes and the addition of new terms to occur at a future date.

Mathematics 7-12 Glossary DRAFT

7th Grade	
box and whisker plots: a graph that uses a rectangle (or box) to represent the middle 50% of a set of data (the midquartile range) and line segments (or *whiskers*) at both ends to represent the remainder of the data.	*Algebra to Go: A mathematics handbook* (p. 480). (2000). Wilmington, MA: Great Source Education Group, Inc
compose or decompose numbers: flexibly using or knowing numbers through creating and breaking numbers apart to form equivalent representations. Grade 7 should include exponential notation. For example, 36 can be thought of as 32 + 4, 20 + 16, 40 – 4, 12 X 3, 2^2 x 3^2, etc.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 149).
conjectures: a mathematical statement which has neither been proved, nor denied by counterexample.	Karush, W. (1962)The Crescent Dictionary of Mathematics; p. 53; The Macmillan Company, New York
contraction: a transformation in which a similar image is formed by reducing its pre-image. The image and its pre-image are similar figures.	Simmons, Bruce Retrieved from http://www.mathwords.com
coordinate plane: a plane determined by the intersection of two perpendicular number lines in which the coordinates of a point are its distances from the number lines	*Geometry to go: A mathematics handbook*(p. 451). (2001). Wilmington, MA: Great Source Education Group, Inc
corresponding angles: angles in the same relative position in similar or congruent figures	*Geometry to go: A mathematics handbook*(p. 452). (2001). Wilmington, MA: Great Source Education Group, Inc.
corresponding sides: sides in the same relative position in similar or congruent figures	*Geometry to go: A mathematics handbook*(p. 452). (2001). Wilmington, MA: Great Source Education Group, Inc.
dilation: a transformation in which a similar image is formed by enlarging (magnification) or reducing (contraction) its pre-image. The image and its pre-image are similar figures	*Geometry to go: A mathematics handbook*(p. 454). (2001). Wilmington, MA: Great Source Education Group, Inc.
factor: an integer that will divide evenly into another number. 1, 2, 3, 4, 6, 12 are all factors of 12, since 12 is divisible by each.	*Math at hand: A mathematics handbook* (p. 524). (1999). Wilmington, MA: Great Source Education Group, Inc.
function: a mathematical rule between two sets which assigns to each number of the first, exactly one member of the second.	McGraw -Hill Dictionary of Mathematics (1997), Parker, S. editor. (p. 94). New York, NY: McGraw
graphical representation – the plot of points in the plane which constitute the graph of a given real function or a pictorial diagram depicting the interdependence of variables.	McGraw-Hill Dictionary of Mathematics (1997), Parker, S. editor. (p. 102). New York, NY: McGraw
histogram: A histogram is a bar graph that shows how many data values fall into a certain interval. The number of data items in an interval is a frequency. The width of the bar represents the interval, while the height indicates the number of data items, or frequency, in that interval..	Intermath http://www.intermath-uga.gatech.edu/dictnary/related.asp?termid=167

Mathematics 7-12 Glossary DRAFT

Informal transformations: transformations such as reflections(flips), rotations(turns), and translations(slides) completed by using physical objects, figures traced on paper, mirrors or other reflective surfaces, etc.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 232, 235). Reston, VA: Author
interquartile range: the difference between the upper quartile and the lower quartile.	*Algebra to Go: A mathematics handbook* (p. 491). (2000). Wilmington, MA: Great Source Education Group, Inc
isometric drawing: drawings that provide a corner view of an object, thus showing three dimensions. Use isometric dot paper to make these views	*Geometry to go: A mathematics handbook*(p. 459). (2001). Wilmington, MA: Great Source Education Group, Inc
linear: a relationship between two variables that can be expressed as an equation and drawn as a straight line.	*Schaum's A -Z Mathematics* (2003). Berry, J, p.132, London, England, McGraw
magnification: a transformation in which a similar image is formed by enlarging its pre-image. The image and its pre-image are similar figures	*Geometry to go: A mathematics handbook*(p. 454). (2001). Wilmington, MA: Great Source Education Group, Inc
measures of center: (or measures of central tendency) values intended to indicate the typical value in a collection of data. The mean, median, and mode are measures of central tendency.	*Algebra to Go: A mathematics handbook* (p. 494). (2000). Wilmington, MA: Great Source Education Group, Inc
model: a representation of a given situation that can be used to describe the present situation or predict some aspect of the situation in the future. A mathematical model is a representation in the form of a mathematical quantity such as a number, a vector, a formula, an inequality, a graph, a table of values, etc	*Schaum's A-Z Mathematics* (2003). Berry, J, p.146, London, England, McGraw-Hill
multiple: the product of a whole number and any other whole number. Multiples of 5 include 0, 5, 10, 15, … etc.	*Math on call: A mathematics handbook* (p. 584). (1998). Wilmington, MA: Great Education Source Group, Inc.
nonlinear: a relationship between two variables x and y is described as nonlinear if it is not of the form $y = ax + b$. The graphs will not be straight lines, the equation will not be of the first degree. For example, $y = e^x$ and $y = x^2$ are nonlinear relationships..	*Schaum's A Z Mathematics* (2003). Berry, J, p.154, London, England, McGraw
numerically: pertaining to numbers.	McGraw-Hill Dictionary of Mathematics (1997), Parker, S. editor. (p. 170). New York, NY: McGraw-Hill, Inc.
precision: an indication of how finely a measurement was made. When you calculate with measured values, you may need to round to the smallest place in the roughest actual measurements.	*Algebra to Go: A mathematics handbook* (p. 499). (2000). Wilmington, MA: Great Source Education Group, Inc
properties of operations: associative and commutative properties of addition and multiplication, the distributive property of multiplication over addition to simplify computations; order of operations should be followed. Example: $3(3+5^2)\div7+1 = 3(3+25)\div7+1 = 3(28)\div7+1=84\div7+1=12+1=13$	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 214). Reston, VA: Author
properties of shapes: should include ideas such as	*Geometry to go: A mathematics handbook*(p.

equality of sides, parallel sides, symmetry, angle relationships, or other ways that can distinguish one shape from another.	459). (2001). Wilmington, MA: Great Source Education Group, Inc
recursive notation: a process that is inherently repetitive, with the result of each repetition usually depending upon those of the previous repetition. **Added Note** – Recursive notation requires the previous term (or information to begin) to generate the next term. This type of function follows a pattern that "reoccurs	McGraw-Hill Dictionary of Mathematics (1997), Parker, S. editor. (p. 210). New York, NY: McGraw-Hill, Inc
representations: the ways that mathematical ideas are represented, i.e. physical objects, drawings, charts, graphs, and symbols.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 280). Reston, VA: Author
similar polygons: polygons that have the same shape, but not necessarily the same size. Corresponding sides of similar polygons are proportional. Corresponding angles are congruent	*Geometry to go: A mathematics handbook*(p. 459). (2001). Wilmington, MA: Great Source Education Group, Inc
symbolic rules: rules that use variables and numbers to describe a pattern or express a relationship. For example the rule 3X + 2 describes 5, 8 ,11, 14, 17, …	*Navigating through algebra in grades 6–8* (p. 3) (2001). Reston, VA: National Council of Teachers of Mathematics
visual models: models such as networks that could be used in analyzing and solving real problems such as those concerned with efficiency. The models of 2 and 3 dimensional objects may also assist students reasoning about spatial relationships	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 237). Reston, VA: Author
8th Grade	
compose or decompose numbers: flexibly using or knowing numbers through creating and breaking numbers apart to form equivalent representations. Grade 8 should include scientific notation. For example, 36 can be thought of as 32 + 4, 20 + 16, 40 – 4, 12 X 3, 2^2 x 3^2 , 3.6 x 10^1 etc.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 149).
conjectures: a mathematical statement which has neither been proved, nor denied by counterexample.	Karush, W. (1962)The Crescent Dictionary of Mathematics; p. 53; The Macmillan Company, New York
corresponding angles: angles in the same relative position in similar or congruent figures	*Geometry to go: A mathematics handbook*(p. 452). (2001). Wilmington, MA: Great Source Education Group, Inc.
corresponding sides: sides in the same relative position in similar or congruent figures	*Geometry to go: A mathematics handbook*(p. 452). (2001). Wilmington, MA: Great Source Education Group, Inc.
cross section: a plane shape formed when a plane cuts through a three dimensional figure.	*Algebra to Go: A mathematics handbook* (p. 484). (2000). Wilmington, MA: Great Source Education Group, Inc
dilation: a transformation in which a similar image is formed by enlarging (magnification) or reducing (contraction) its pre-image. The image and its pre-image are similar figures	*Geometry to go: A mathematics handbook*(p. 454). (2001). Wilmington, MA: Great Source Education Group, Inc.
factor: an integer that will divide evenly into another	*Math at hand: A mathematics handbook* (p.

number. 1, 2, 3, 4, 6, 12 are all factors of 12, since 12 is divisible by each.	524). (1999). Wilmington, MA: Great Source Education Group, Inc.
formal transformations: transformations which include reflections, rotations, and translations performed on a coordinate grid.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 232, 235). Reston, VA: Author
function: a mathematical rule between two sets which assigns to each number of the first, exactly one member of the second.	McGraw -Hill Dictionary of Mathematics (1997), Parker, S. editor. (p. 94). New York, NY: McGraw
graphical representation: the plot of points in the plane which constitute the graph of a given real function or a pictorial diagram depicting the interdependence of variables.	McGraw-Hill Dictionary of Mathematics (1997), Parker, S. editor. (p. 102). New York, NY: McGraw
interquartile range: the difference between the upper quartile and the lower quartile.	*Algebra to Go: A mathematics handbook* (p. 491). (2000). Wilmington, MA: Great Source Education Group, Inc
isometric drawing**:** drawings that provide a corner view of an object, thus showing three dimensions. Use isometric dot paper to make these views	*Geometry to go: A mathematics handbook*(p. 459). (2001). Wilmington, MA: Great Source Education Group, Inc
mat plans: drawings of the base of a cube, with numbers on the squares to show how high each stack of cubes is.	Lappan, G. Frey, J. T., Fitzgerald, W. M., Friel, S. N., & Phillips, E. D. (2002). Ruins of Montarek spatial visualization. *Connected mathematics* (p. 9). Glenview, IL: Prentice Hall.
measures of center: (or measures of central tendency) values intended to indicate the typical value in a collection of data. The mean, median, and mode are measures of central tendency.	*Algebra to Go: A mathematics handbook* (p. 494). (2000). Wilmington, MA: Great Source Education Group, Inc
model: to represent a mathematical situation with manipulatives (objects), pictures, numbers or symbols.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 95). Reston, VA: Author
multiple: the product of a whole number and any other whole number.	*Math on call: A mathematics handbook* (p. 584). (1998). Wilmington, MA: Great Education Source Group, Inc.
numerical: pertaining to numbers. **Note:** patterns expressed numerically typically are a list: 1, 4, 9, 16, …	McGraw-Hill Dictionary of Mathematics (1997), Parker, S. editor. (p. 170). New York, NY: McGraw-Hill, Inc.
outlier: data that are more than 1.5 times the interquartile range from the quartiles.	Price, J., Rath, J., Leschensky, W., Malloy, C., Alban, Y., (1997). Pre-Algebra An Integrated Transition to Algebra $ Geometry. (P. 792). The McGraw-Hill Companies, Inc. New York, New York
precision: an indication of how finely a measurement was made. When you calculate with measured values, you may need to round to the smallest place in the roughest actual measurements.	*Algebra to Go: A mathematics handbook* (p. 499). (2000). Wilmington, MA: Great Source Education Group, Inc
properties of linear functions: defining characteristics such as slope, y-intercept, rate of change, overall picture of linearity, and how a change in value of one parameter affects the graph, table, and equation of	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 224-225). Reston, VA: Author

the function.	
properties of operations: associative and commutative properties of addition and multiplication and the distributive property of multiplication over addition to simplify computations; including order of operations	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 214). Reston, VA: Author
properties of right triangles: mathematical ideas such as: • Right triangles have exactly one right angle. • The acute angles of a right triangle are complementary. • The square of the length of the hypotenuse is equal to the sum of the squares of the lengths of the legs.	*Geometry to go: A mathematics handbook*(p. 150-152). (2001). Wilmington, MA: Great Source Education Group, Inc
properties of shapes: should include ideas such as equality of sides, parallel sides, symmetry, angle relationships, or other ways that can distinguish one shape from another.	*Geometry to go: A mathematics handbook*(p. 459). (2001). Wilmington, MA: Great Source Education Group, Inc
recursive notation: a process that is inherently repetitive, with the result of each repetition usually depending upon those of the previous repetition. Added Note – Recursive notation requires the previous term (or information to begin) to generate the next term. This type of function follows a pattern that "reoccurs	McGraw-Hill Dictionary of Mathematics (1997), Parker, S. editor. (p. 210). New York, NY: McGraw-Hill, Inc
reflex angle: an angle that measures more than 180^0.	*Algebra to Go: A mathematics handbook* (p. 502). (2000). Wilmington, MA: Great Source Education Group, Inc
representations: the ways that mathematical ideas are represented, i.e. physical objects, drawings, charts, graphs, and symbols.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 280). Reston, VA: Author
scatter plot: a graph with one point for each item being measured. The coordinates of a point represent the measures of two attributes of each item.	*Algebra to Go: A mathematics handbook* (p. 503). (2000). Wilmington, MA: Great Source Education Group, Inc
similar polygons: polygons that have the same shape, but not necessarily the same size. Corresponding sides of similar polygons are proportional. Corresponding angles are congruent	*Geometry to go: A mathematics handbook*(p. 459). (2001). Wilmington, MA: Great Source Education Group, Inc
symbolic algebra: using variables and numbers to characterize and represent mathematical situations	*Navigating through Algebra in grades 6–8* (p. 59) (2001). Reston, VA: National Council of Teachers of Mathematics
symbolic rules: rules that use variables and numbers to describe a pattern or express a relationship. For example the rule 3X + 2 describes 5, 8 ,11, 14, 17, …	*Navigating through Algebra in grades 6–8* (p. 3) (2001). Reston, VA: National Council of Teachers of Mathematics

visual models: models such as networks that could be used in analyzing and solving real problems such as those concerned with efficiency. The models of 2 and 3 dimensional objects may also assist students reasoning about spatial relationships	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 237). Reston, VA: Author
9th Grade	
conjecture: a mathematical statement which has neither been proved, nor denied by counterexample.	Karush, W. (1962)The Crescent Dictionary of Mathematics; p. 53; The Macmillan Company, New York
explicit function: An explicit function of x is a function whose values are given by an explicit expression (algebraic or otherwise) in x. For example, the equation y=2x-3 gives values of y as an explicit function of x(solving for x in terms of y would express the value of x as an explicit function of y). **Note:** An explicit function that could be used to describe the nth stage (or term) would be Area = 2xstage number – 1. Using this type of function allows one to "jump" to the stage in question. For example if you wanted the 7^{th} stage substitute 7 in for stage number meaning Area = 2x7 – 1 = 14 – 1 = 13, or the 20^{th} stage would be Area = 2x20 – 1 = 40 – 1 = 39.	Karush, W. (1962)The Crescent Dictionary of Mathematics; p. 101; The Macmillan Company, New York
exponential function: a function of the form $f(x) = ab^x$, where $a \neq 0$, $b > 0$, $b \neq 1$, and x is a real number.. Note: e^x is called the natural exponential function where e is the irrational number 2.718281828 correct to ten significant figures. It is often shown on a calculator as "exp" and the exponential function is often written as exp(x).	*Schaum's A-Z Mathematics* (2003). Berry, J, p.87, London, England, McGraw-Hill
function: a mathematical rule between two sets which assigns to each number of the first, exactly one member of the second.	McGraw -Hill Dictionary of Mathematics (1997), Parker, S. editor. (p. 94). New York, NY: McGraw
line of best fit: a line, segment, or ray drawn on a scatter plot to estimate the relationship between two sets of data.	*Algebra to Go: A mathematics handbook* (p. 492). (2000). Wilmington, MA: Great Source Education Group, Inc
linear function: a relationship between two variables that can be expressed as an equation and drawn as a straight line.	*Schaum's A-Z Mathematics* (2003). Berry, J, p.132, London, England, McGraw-Hill.
network: a collection of points which may or may not be connected by edges.	Geometry to Go: A mathematics handbook (p.463). (2001). Wilmington, MA: Great Source Education Group, Inc
one-variable quantitative data: data which takes numerical values for which arithmetic operations such as adding and averaging makes sense.	Yates, D., Starnes, D., Moore, D., (2005) *Statistics Through Applications;* p.206; W.H. Freeman and Company, New York
parameter: a single number that describes some	National Council of Teachers of Mathematics. (2000). *Principles and standards for school*

aspect of an entire population. Whereas, a statistic is an estimate of that value computed from some sample of the population.	*mathematics* (p. 329). Reston, VA: Author
precision: an indication of how finely a measurement was made. When you calculate with measured values, you may need to round to the smallest place in the roughest actual measurements.	*Algebra to Go: A mathematics handbook* (p. 499). (2000). Wilmington, MA: Great Source Education Group, Inc
properties of exponents: rules applied when operations are performed on algebraic expressions containing exponents. In general: $a^0 = 1; a \neq 0$, $a^m a^n = a^{m+n}$, $(ab)^n = a^n b^n$, $(a^m)^n = a^{mn}$, etc. .	Bellmann, A., Bragg, S., Charles, R., Handlin, W., Kennedy, D.(2004); Prentice Hall *Algebra 2,* p. 362, Upper Saddle River, New York, Pearson Education, Inc.
recursive notation: A process that is inherently repetitive, with the result of each repetition usually depending upon those of the previous repetition. **Added Note** - Recursive notation requires the previous term (or information to begin) to generate the next term. This type of function follows a pattern that "reoccurs". The power of this type of function is not in solving this particular problem, rather in helping students use patterns to generate conclusions as well as bring meaning to explicit functions. One example of a recursive function that could be used to solve this problem is $Next = Now + 2$ starting with *Now* = 1. This function works by putting the Now value into the function in this case beginning with 1 + 2 giving the Next value to be 3 which will be the value substituted back into the function. This is not efficient to find many terms beyond the initial values, but when students use this structure they generate greater understanding of this linear pattern. The fact that you are continuing to add 2 matches the slope in the explicit equation form. This seems to make more sense as you are in fact adding with the change rather than multiplying as the explicit form "looks".	McGraw-Hill Dictionary of Mathematics (1997), Parker, S. editor. (p. 210). New York, NY: McGraw-Hill, Inc..
representations: : the ways that mathematical ideas are represented, i.e. physical objects, drawings, charts, graphs, and symbols.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 280). Reston, VA: Author
sample space: the set of all possible outcomes of an experiment. The sample space is typically denoted by *S* and may take any number of forms: a list, a tree diagram, a lattice grid system, and so on.	Johnson, Robert and Kuby, Patricia (2004). Elementary Statistics; p. 191; Thompson Learning, Inc., USA
symbolic algebra: using variables and numbers to characterize and represent mathematical situations	*Navigating through algebra in grades 6–8* (p. 59) (2001). Reston, VA: National Council of Teachers of Mathematics
unit analysis: keeping track of units during computation to assure accurate and appropriate reporting of information.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 322). Reston, VA: Author

vertex-edge graphs: a network of vertices and edges. The edges, vertices, or both may be assigned specific values, labels, or colors, in which case the graph is called a labeled graph. The edges may also be imbued with directedness or may be left unlabeled. Vertex edge graphs are used to find optimal solutions to problems involving paths, networks, or relationships among a finite number of objects.	Weisstein, Eric W., "Vertex-Edge Graph," From *MathWorld*--A Wolfram Web Resource. http://mathworld.wolfram.com/Vertex-EdgeGraph.html National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 322). Reston, VA: Author
visual models**:** models such as networks that could be used in analyzing and solving real problems such as those concerned with efficiency. The models of 2 and 3 dimensional objects may also assist students reasoning about spatial relationships	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 237). Reston, VA: Author
10th Grade	
bivariate: the values of two different variables that are obtained from the same population element.	Johnson, Robert and Kuby, Patricia (2004). Elementary Statistics; p. 130; Thompson Learning, Inc., USA
categorical data: a variable that describes or categorizes an element of a population; also referred to as qualitative or attribute variables.	Johnson, Robert and Kuby, Patricia (2004). Elementary Statistics; p. 14; Thompson Learning, Inc., USA
conditional probability: P(A | B) represents the probability that A will occur given that B has occurred. This is called a conditional probability.	Johnson, Robert and Kuby, Patricia (2004). Elementary Statistics; p. 209; Thompson Learning, Inc., USA
conjecture: a mathematical statement which has neither been proved, nor denied by counterexample.	Karush, W. (1962)The Crescent Dictionary of Mathematics; p. 53; The Macmillan Company, New York
explicit function: an explicit function of x is a function whose values are given by an explicit expression (algebraic or otherwise) in x. For example, the equation y=2x-3 gives values of y as an explicit function of x(solving for x in terms of y would express the value of x as an explicit function of y). **Note:** An explicit function that could be used to describe the nth stage (or term) would be Area = 2·stage number – 1. Using this type of function allows one to "jump" to the stage in question. For example if you wanted the 7^{th} stage substitute 7 in for stage number meaning Area = 2·7 – 1 = 14 – 1 = 13, or the 20^{th} stage would be Area = 2·20 – 1 = 40 – 1 = 39.	Karush, W. (1962)The Crescent Dictionary of Mathematics; p. 101; The Macmillan Company, New York
exponential function: a function of the form $f(x) = ab^x$, where $a \neq 0$, $b > 0$, $b \neq 1$, and x is a real number.. Note: e^x is called the natural exponential function where e is the irrational number 2.718281828 correct to ten significant figures. It is often shown on a calculator as "exp" and the exponential function is often written as exp(x).	*Schaum's A-Z Mathematics* (2003). Berry, J, p.87, London, England, McGraw-Hill
function: a mathematical rule between two sets which assigns to each number of the first, exactly one member of	McGraw -Hill Dictionary of Mathematics (1997), Parker, S. editor. (p. 94). New York, NY:

the second.	McGraw
independent events: two events are independent events if and only if the occurrence (or nonoccurrence) of one does not affect the probability assigned to the occurrence of the other.	Johnson, Robert and Kuby, Patricia (2004). Elementary Statistics; p. 209; Thompson Learning, Inc., USA
informal inference: to use information contained in the sample data to increase our knowledge of the sampled population.	Johnson, Robert and Kuby, Patricia (2004). Elementary Statistics; p. 340; Thompson Learning, Inc., USA
linear function: a relationship between two variables that can be expressed as an equation and drawn as a straight line.	*Schaum's A-Z Mathematics* (2003). Berry, J, p.132, London, England, McGraw-Hill.
one-variable quantitative data: data which takes numerical values for which arithmetic operations such as adding and averaging makes sense.	Yates, D., Starnes, D., Moore, D., (2005) *Statistics Through Applications;* p.206; W.H. Freeman and Company, New York
parameter: a single number that describes some aspect of an entire population. Whereas, a statistic is an estimate of that value computed from some sample of the population.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 329). Reston, VA: Author
precision: an indication of how finely a measurement was made. When you calculate with measured values, you may need to round to the smallest place in the roughest actual measurements.	*Algebra to Go: A mathematics handbook* (p. 499). (2000). Wilmington, MA: Great Source Education Group, Inc
probability distribution: a distribution of the probabilities associated with each of the values of a random variable. The probability distribution is a theoretical distribution; it is used to represent populations.	Johnson, Robert and Kuby, Patricia (2004). Elementary Statistics; p. 236; Thompson Learning, Inc., USA
properties of exponents: rules applied when operations are performed on algebraic expressions and equations containing exponents. In general: $a^0 = 1, a \neq 0$, $a^m a^n = a^{m+n}$, $(ab)^n = a^n b^n$, $(a^m)^n = a^{mn}$, etc. $3x^3y^2 + 4x^3y^2 = 7x^3y^2$; $3x^3y^2(4x^3y^2) = 12x^6y^4$; $(3x^3y^2)^3 = 27\ x^9y^6$, etc	Bellmann, A., Bragg, S., Charles, R., Handlin, W., Kennedy, D.(2004); Prentice Hall *Algebra 2,* p. 362, Upper Saddle River, New York, Pearson Education, Inc.
quadratic function: a function whose value is given by a quadratic polynomial. The graph of the function is the graph of $y = ax^2 + bx + c$; it is a parabola with a vertical axis; the vertex is the low point or high point according to whether a is positive or negative. The solutions of the quadratic equation $ax^2 + bx + c = 0$ are called the zeros of the quadratic function; they specify the points of the graph where y = 0 (the intersection with the x-axis). The graph crosses the x-axis twice, once, or not at all according to whether the discriminant $b^2 - 4ac$ of the quadratic equation is positive, zero, or negative.	*The crescent Dictionary of Mathematics* (1962). Karush, W., p. 218, The Macmillan Company, New York.
recursive notation: a process that is inherently repetitive, with the result of each repetition usually depending upon those of the previous repetition.	McGraw-Hill Dictionary of Mathematics (1997), Parker, S. editor. (p. 210). New York, NY: McGraw-Hill, Inc..

Added Note - Recursive notation requires the previous term (or information to begin) to generate the next term. This type of function follows a pattern that "reoccurs". The power of this type of function is not in solving this particular problem, rather in helping students use patterns to generate conclusions as well as bring meaning to explicit functions. One example of a recursive function that could be used to solve this problem is $Next = Now + 2$ starting with *Now* = 1. This function works by putting the Now value into the function in this case beginning with 1 + 2 giving the Next value to be 3 which will be the value substituted back into the function. This is not efficient to find many terms beyond the initial values, but when students use this structure they generate greater understanding of this linear pattern. The fact that you are continuing to add 2 matches the slope in the explicit equation form. This seems to make more sense as you are in fact adding with the change rather than multiplying as the explicit form "looks".	
representations: the ways that mathematical ideas are represented, i.e. physical objects, drawings, charts, graphs, and symbols.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 280). Reston, VA: Author
sample space: the set of all possible outcomes of an experiment. The sample space is typically denoted by *S* and may take any number of forms: a list, a tree diagram, a lattice grid system, and so on.	Johnson, Robert and Kuby, Patricia (2004). Elementary Statistics; p. 191; Thompson Learning, Inc., USA
sampling distributions: of a statistic tells us what values the statistic takes in repeated samples from the same population and how often it takes those values. Sampling distributions assign probabilities to the values the statistic can take.	Yates, D., Starnes, D., Moore, D., (2005) *Statistics Through Applications;* p.432; W.H. Freeman and Company, New York
similar objects: solids that have exactly the same shape but not necessarily the same size.	Boyd, C., Cummins, J., Malloy, C., Carter, J., Flores, A., (2005) *Geometry*; p. 707; The McGraw-Hill Companies, Inc. ; Columbus, OH
symbolic algebra: using variables and numbers to characterize and represent mathematical situations	*Navigating through algebra in grades 6–8* (p. 59) (2001). Reston, VA: National Council of Teachers of Mathematics
visual models**:** models such as networks that could be used in analyzing and solving real problems such as those concerned with efficiency. The models of 2 and 3 dimensional objects may also assist students reasoning about spatial relationships	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 237). Reston, VA: Author
11th Grade	
composition of functions: (composite function) is a combination of two functions such that the output from the first function becomes the input for the second function.	Bellmann, A., Bragg, S., Charles, R., Handlin, W., Kennedy, D.(2004); Prentice Hall *Algebra 2,* p. 876, Upper Saddle River, New York, Pearson Education, Inc.
compound events: combinations of more than one simple event. There are three basic categories: the	Johnson, Robert and Kuby, Patricia (2004). Elementary Statistics; p. 202; Thompson

probability that event A or event B will occur, P(A or B), the probability that both events A and B will occur, P(A and B), and the probability that event A will occur given that event B has occurred, P(A | B).	Learning, Inc., USA
expected value: the value of a random phenomenon that has numerical outcomes is found by multiplying each outcome by its probability and then summing over all possible outcomes. In symbols, if the possible outcomes are a_1, a_2, …., a_k. and their probabilities are p_1, p_2, …,p_k , the expected value is = $a_1p_1 + a_2p_2 + \ldots\_ a_kp_k$.	Yates, D., Starnes, D., Moore, D., (2005) *Statistics Through Applications;* p.467; W.H. Freeman and Company, New York
explicit function: an explicit function of x is a function whose values are given by an explicit expression (algebraic or otherwise) in x. For example, the equation y=2x-3 gives values of y as an explicit function of x(solving for x in terms of y would express the value of x as an explicit function of y). Note: An explicit function that could be used to describe the nth stage (or term) would be Area = 2·stage number – 1. Using this type of function allows one to "jump" to the stage in question. For example if you wanted the 7^{th} stage substitute 7 in for stage number meaning Area = 2·7 – 1 = 14 – 1 = 13, or the 20^{th} stage would be Area = 2·20 – 1 = 40 – 1 = 39.	Karush, W. (1962)The Crescent Dictionary of Mathematics; p. 101; The Macmillan Company, New York
exponential function: a function of the form $f(x) = ab^x$, where $a \neq 0$, $b > 0$, $b \neq 1$, and x is a real number.. Note: e^x is called the natural exponential function where e is the irrational number 2.718281828 correct to ten significant figures. It is often shown on a calculator as "exp" and the exponential function is often written as exp(x).	*Schaum's A-Z Mathematics* (2003). Berry, J, p.87, London, England, McGraw-Hill
function: a mathematical rule between two sets which assigns to each number of the first, exactly one member of the second.	McGraw -Hill Dictionary of Mathematics (1997), Parker, S. editor. (p. 94). New York, NY: McGraw
intensity levels: strength, power, force, or concentration of measures such as decibels and ph, often displayed on a logararithimic scale.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 321-322). Reston, VA: Author
inverse function: if f^{-1} is a function such that $f(x) = y$, then the inverse of f, denoted f^{-1} is such that $f^{-1}(y) = x$. The domain of the function f becomes the range of the inverse function f^{-1} and the range of f becomes the domain of f^{-1}. It is important to note that a function will only have an inverse if the function is a one to one and not a many to one mapping.	*Schaum's A-Z Mathematics* (2003). Berry, J, p.124, London, England, McGraw-Hill
linear function: a function of the form $f(x) = mx + b$ where m and b are some fixed numbers. The names "m" and "b" are traditional. Functions of this kind are called "linear" because their graphs are straight lines.	Mathematics Dictionary www.shodor.org/interactivate/dictionary/l.html

Mathematics 7-12 Glossary DRAFT

logarithmic function: functions that involve logarithms, for example: $f(x) = 4 \log (x + 1)$	*Schaum's A-Z Mathematics* (2003). Berry, J, p.134, London, England, McGraw-Hill.
one-variable quantitative data: data which takes numerical values for which arithmetic operations such as adding and averaging makes sense.	Yates, D., Starnes, D., Moore, D., (2005) *Statistics Through Applications;* p.206; W.H. Freeman and Company, New York
parameter: a single number that describes some aspect of an entire population. Whereas, a statistic is an estimate of that value computed from some sample of the population.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 329). Reston, VA: Author
parametric relationship: a pair of continuous functions that define the x- and y-coordinates of points in a coordinate plane in terms of a third variable, the parameter.	Hungerford, T., Jovell, I., Mayberry, B., (2004); *Pre-Calculus A Graphing Approach*; p. 1049; Holt, Rinehart, Winston; Austin, Texas
properties of logarithms: for any positive numbers, M, N, and b, $b \neq 1$, $\log_b MN = \log_b M + \log_b N$ Product Property $\log_b M/.N = \log_b M - \log_b N$ Quotient Property $\log_b M^x = x \log_b M$ Power Property	Bellmann, A., Bragg, S., Charles, R., Handlin, W., Kennedy, D.(2004); Prentice Hall *Algebra 2,* p. 446, Upper Saddle River, New York, Pearson Education, Inc
quadratic function: a function whose value is given by a quadratic polynomial. The graph of the function is the graph of $y = ax^2 + bx + c$; it is a parabola with a vertical axis; the vertex is the low point or high point according to whether a is positive or negative. The solutions of the quadratic equation $ax^2 + bx + c = 0$ are called the zeros of the quadratic function; they specify the points of the graph where y = 0 (the intersection with the x-axis). The graph crosses the x-axis twice, once, or not at all according to whether the discriminant $b^2 – 4ac$ of the quadratic equation is positive, zero, or negative.	*The crescent Dictionary of Mathematics* (1962). Karush, W., p. 218, The Macmillan Company, New York.
recursive notation: a process that is inherently repetitive, with the result of each repetition usually depending upon those of the previous repetition. Added Note - Recursive notation requires the previous term (or information to begin) to generate the next term. This type of function follows a pattern that "reoccurs". The power of this type of function is not in solving this particular problem, rather in helping students use patterns to generate conclusions as well as bring meaning to explicit functions. One example of a recursive function that could be used to solve this problem is $Next = Now + 2$ starting with *Now* = 1. This function works by putting the Now value into the function in this case beginning with 1 + 2 giving the Next value to be 3 which will be the value substituted back into the function. This is not efficient to find many terms beyond the initial values, but when students use this structure they generate greater understanding of this linear pattern. The fact that you are	McGraw-Hill Dictionary of Mathematics (1997), Parker, S. editor. (p. 210). New York, NY: McGraw-Hill, Inc..

continuing to add 2 matches the slope in the explicit equation form. This seems to make more sense as you are in fact adding with the change rather than multiplying as the explicit form "looks".	
representations: the ways that mathematical ideas are represented, i.e. physical objects, drawings, charts, graphs, and symbols.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 280). Reston, VA: Author
sampling distributions: of a statistic tells us what values the statistic takes in repeated samples from the same population and how often it takes those values. Sampling distributions assign probabilities to the values the statistic can take.	Yates, D., Starnes, D., Moore, D., (2005) *Statistics Through Applications;* p.432; W.H. Freeman and Company, New York
summary statistics: statistics used to summarize a set of observations, in order to communicate as much as possible as simply as possible. Statisticians commonly try to describe the observations in 1) a measure of location, or central tendency, such as the arithmetic mean, median, mode, or interquartile mean; 2) a measure of statistical dispersion like the standard deviation, variance, range, or interquartile range, or absolute deviation; 3) a measure of the shape of the distribution like.	http://www.mywiseowl.com/articles/Summary_statistics
symbolic algebra: using variables and numbers to characterize and represent mathematical situations	*Navigating through algebra in grades 6–8* (p. 59) (2001). Reston, VA: National Council of Teachers of Mathematics
unit analysis: keeping track of units during computation to assure accurate and appropriate reporting of information.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 322). Reston, VA: Author
visual models: models such as networks that could be used in analyzing and solving real problems such as those concerned with efficiency. The models of 2 and 3 dimensional objects may also assist students reasoning about spatial relationships	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 237). Reston, VA: Author
12th Grade	
basic statistical techniques: reasoning about the relationship between the characteristics of a sample and the population from which it is drawn in order to draw conclusions or make predictions.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 331). Reston, VA: Author
composition of functions: (composite function) is a combination of two functions such that the output from the first function becomes the input for the second function.	Bellmann, A., Bragg, S., Charles, R., Handlin, W., Kennedy, D.(2004); Prentice Hall *Algebra 2,* p. 876, Upper Saddle River, New York, Pearson Education, Inc.
empirical probability: experimental or observed probability, denoted with prime notation. P'(A) = n(A)/n or probability of A = number of times A occurred / number of trials	Johnson, Robert and Kuby, Patricia (2004). Elementary Statistics; p. 191; Thompson Learning, Inc., USA
explicit function: an explicit function of x is a function whose values are given by an explicit expression	Karush, W. (1962)The Crescent Dictionary of Mathematics; p. 101; The Macmillan Company,

(algebraic or otherwise) in x. For example, the equation y=2x-3 gives values of y as an explicit function of x(solving for x in terms of y would express the value of x as an explicit function of y). **Note:** An explicit function that could be used to describe the nth stage (or term) would be Area = 2·stage number – 1. Using this type of function allows one to "jump" to the stage in question. For example if you wanted the 7^{th} stage substitute 7 in for stage number meaning Area = 2·7 – 1 = 14 – 1 = 13, or the 20^{th} stage would be Area = 2·20 – 1 = 40 – 1 = 39.	New York
exponential function: a function of the form $f(x) = ab^x$, where $a \neq 0$, $b > 0$, $b \neq 1$, and x is a real number.. Note: e^x is called the natural exponential function where e is the irrational number 2.718281828 correct to ten significant figures. It is often shown on a calculator as "exp" and the exponential function is often written as exp(x).	*Schaum's A-Z Mathematics* (2003). Berry, J, p.87, London, England, McGraw-Hill
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logarithmic function: functions that involve logarithms, for example: $f(x) = 4 \log (x + 1)$	*Schaum's A-Z Mathematics* (2003). Berry, J, p.134, London, England, McGraw-Hill.
parametric: a pair of continuous functions that define the x- and y-coordinates of points in a coordinate plane in terms of a third variable, the parameter.	Hungerford, T., Jovell, I., Mayberry, B., (2004); *Pre-Calculus A Graphing Approach*; p. 1049; Holt, Rinehart, Winston; Austin, Texas
periodic function: a function that repeats itself at regular intervals. The trigonometric functions are periodic.	*Algebra to Go: A mathematics handbook* (p. 498). (2000). Wilmington, MA: Great Source Education Group, Inc
polynomial function: a function whose values are given by a polynomial. The function is linear, quadratic, cubic, etc., according as the polynomial is. The graph of a linear function (in one variable) is a line, and of a quadratic polynomial is a parabola, etc. In general, the graph of a polynomial function p(x) may contain several peaks and troughs (maxima and minima), but the largest possible number of these is one less than the degree.	*The crescent Dictionary of Mathematics* (1962). Karush, W., p. 204, The Macmillan Company, New York.
properties of functions: the characteristics which define different classes of functions from one another , such as linear functions graphing as a straight line,	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (pp. 297-299). Reston, VA: Author

quadratic as a parabola, etc. Properties also include getting a snapshot of the graph by viewing the equation or how the values of the parameters shape the graph, i.e. orientation on the coordinate plane, slope, intercepts, opening up/down, etc.	
rational function: a quotient of two polynomials P(z) and Q(z), R(z), is called a rational function, or sometimes a rational polynomial function.	Weisstein, Eric W., "rational function," From *MathWorld*--A Wolfram Web Resource. http://mathworld.wolfram.com/RationalFunction.html
recursive notation: a process that is inherently repetitive, with the result of each repetition usually depending upon those of the previous repetition. **Added Note** - Recursive notation requires the previous term (or information to begin) to generate the next term. This type of function follows a pattern that "reoccurs". The power of this type of function is not in solving this particular problem, rather in helping students use patterns to generate conclusions as well as bring meaning to explicit functions. One example of a recursive function that could be used to solve this problem is $Next = Now + 2$ starting with *Now* = 1. This function works by putting the Now value into the function in this case beginning with 1 + 2 giving the Next value to be 3 which will be the value substituted back into the function. This is not efficient to find many terms beyond the initial values, but when students use this structure they generate greater understanding of this linear pattern. The fact that you are continuing to add 2 matches the slope in the explicit equation form. This seems to make more sense as you are in fact adding with the change rather than multiplying as the explicit form "looks".	McGraw-Hill Dictionary of Mathematics (1997), Parker, S. editor. (p. 210). New York, NY: McGraw-Hill, Inc..
representations: the ways that mathematical ideas are represented, i.e. physical objects, drawings, charts, graphs, and symbols.	National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 280). Reston, VA: Author
symbolic algebra: using variables and numbers to characterize and represent mathematical situations	*Navigating through algebra in grades 6–8* (p. 59) (2001). Reston, VA: National Council of Teachers of Mathematics
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